

Claims

1. Plasma arc cutting process for cutting a metal workpiece, in which a dual-gas-flow torch fitted with  
5 an electrode with an emissive insert is used, the said torch delivering a central gas stream and an annular gas stream, the said annular stream being delivered peripherally to the central gas stream, characterized in that the central gas stream contains a  
10 hydrogen-nitrogen mixture and the peripheral gas stream contains carbon dioxide.
2. Process according to Claim 1, characterized in that the peripheral gas stream contains at least 50%  
15 carbon dioxide, preferably 80 to 100% carbon dioxide, by volume.
3. Process according to either of Claims 1 and 2, characterized in that the central gas stream contains  
20 1.5 to 60% hydrogen, preferably 4 to 10% hydrogen, by volume.
4. Process according to one of Claims 1 to 3, characterized in that the central gas stream contains  
25 1.5 to 60% hydrogen by volume, and nitrogen for the balance.
5. Process according to one of Claims 1 to 4, characterized in that the emissive insert is made of  
30 tungsten or an alloy containing predominantly tungsten.
6. Process according to one of Claims 1 to 5, characterized in that the electrode is made of copper or a copper alloy, in particular a copper-tellurium or  
35 copper-chromium-zirconium alloy.
7. Process according to one of Claims 1 to 6, characterized in that the workpiece to be cut is made

of structural steel, stainless steel or an aluminium alloy, preferably structural steel.

8. Process according to one of Claims 1 to 7,  
5 characterized in that it furthermore includes the steps of:

(a) introducing a first gas stream between a first nozzle of the torch and the electrode so as to obtain the central gas stream,

10 (b) generating an electric arc on the electrode with the emissive insert,

(c) introducing a second gas stream between a second nozzle of the torch and the first nozzle so as to obtain the annular gas stream, it being  
15 possible for step (c) to be before or after step (b),

(d) delivering the central gas stream and the annular gas stream along the direction of a workpiece to be cut, in the form of a plasma arc  
20 jet containing the central and annular gas streams, and the electric arc and

(e) piercing and/or cutting the workpiece by means of the plasma arc jet of step (d).

25 9. Process according to one of Claims 1 to 8, characterized in that the flow rate and the pressure of the central gas stream and of the peripheral annular gas stream are chosen or adjusted according to the thickness to be cut.

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10. Plasma cutting unit comprising:

- a dual-gas-flow torch fitted with an electrode with an emissive insert, a first nozzle placed around the electrode, forming a plasma chamber with the said  
35 electrode, a second nozzle placed coaxially with the first nozzle and forming an internozzle space with the said first nozzle;

- a first gas source containing a hydrogen-nitrogen mixture in fluid communication with

the plasma chamber so as to be able to supply the said plasma chamber with the said gas mixture based on hydrogen and nitrogen; and

- a second gas source containing carbon dioxide
- 5 in fluid communication with the internozzle space so as to be able to supply the internozzle space with the said gaseous carbon dioxide.